

hot springs

A hot spring is a flow of water that emerges naturally from the ground at a temperature at least a few degrees above the ambient mean temperature. Springs such as these have been used for medicinal purposes since ancient times. Today, as a major source of GEOTHERMAL ENERGY, their use has expanded to include home heating and power production.

Hot springs occur worldwide, but they are most numerous in regions where very hot magma has worked its way upward through the Earth's crust to relatively shallow depths below the surface. Groundwater percolates downward and comes in contact with hot rock and is heated by it. Such regions include the active volcanic areas of New Zealand, Iceland, Japan, and Kamchatka, Russia; the older volcanic areas of Yellowstone National Park and the Snake River plain in Idaho; and the rift valleys of the Rio Grande (N.Mex.) and East Africa. Other hot springs, those in the eastern United States and central Europe, exist because a special geologic setting—dipping rock strata or deeply fissured rock—forces groundwater downward, where it circulates to considerable depths and is heated by the Earth's normal temperature increase with depth—i.e., one Celsius degree per 30 to 60 m (one Fahrenheit degree per 50 to 100 ft).

Waters of hot springs originate as relatively pure local and regional precipitation, but as they heat and circulate underground, they often dissolve their host rock and become highly mineralized. Mineralized waters fall into four main groups. Calcium carbonate waters, when they cool, precipitate TRAVERTINE and produce magnificent terraces such as are found at Mammoth Cave and in Yellowstone National Park. Siliceous alkaline waters, laden with silicon dioxide, form the siliceous cones around many geysers. Siliceous acid waters are sandy or muddy and contain hydrochloric and sulfuric acids at a pH of about 4. Saline waters, containing salts, especially the halides, are likely to form heavy salt crusts on the surfaces of adjoining lakes and springs.

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